Student Vehicle Competitions

Government and Industry sponsoring tomorrow's engineers

ENERGY EFFICIENCY AND RENEWABLE ENERGY

OFFICE OF TRANSPORTATION TECHNOLOGIES

Transportation

FOR THE 21ST CENTURY

For America's advanced vehicle technology efforts to be successful, the nation needs a continuing pool of talented, innovative engineers. The U.S. Department of Energy (DOE) has been in the vanguard of fostering our national competitiveness by sponsoring competitions to help identify and encourage young engineering talent. Over the years, these programs have provided high school and college students with the opportunity to gain real-world, hands-on experience tackling the problems associated with building more efficient vehicles. These efforts are already paying off since more than half the students who graduate from these competitions go on to take jobs in the auto and related industries. Employers often look for students who have participated in these competitions.

Since 1988, more than 14,000 students, ranging in age from fourteen to their early twenties, and representing more than 600 institutions, have participated in DOE-sponsored alternative fuel, advanced vehicle technology competitions. In these events, the students have been presented with the challenge of building a vehicle running on cleaner, domestically-produced, and alternative fuels, such as propane, methanol, ethanol, natural gas, biodiesel, and electricity.

A wide range of student events:

FutureTruck

The growing customer demand for light-duty trucks, including pickups, sport utility vehicles, and vans, poses new rewards and challenges. In response to this demand, vehicle manufacturers are providing trucks that offer high levels of comfort and refinement, along with improved functionality. Light-duty trucks now account for nearly 50% of vehicle sales. The success of these and other vehicles in providing mobility and utility to the customer has created some serious challenges from a societal perspective. Building upon the success of the FutureCar Challenge (see below), General Motors and the Department of Energy teamed up to sponsor FutureTruck in 2000 and 2001. Ford Motor Company will replace GM as the automotive sponsor in 2002 and 2003. During the course of this four-year competition, FutureTruck will challenge over 400 students from 15 U.S. and Canadian universities to re-engineer full-size sport utility vehicles to meet the needs of the future – producing green and efficient vehicles that will have the performance, utility, and safety that customers expect. In the first two years, General Motors is supplying the vehicles, seed money, and prize money to the university teams who are modifying model year 2000 Chevrolet Suburbans. Strategies include using cutting-edge technologies, such as fuel cells and other advanced propulsion systems, space-age materials, and alternative fuels like biodiesel and E85. The 2000 event was hosted by the General Motors Desert Proving Ground in Mesa, Arizona from June 8-15, where the winning teams proved that it was possible to increase on-road fuel economy as much as 13% over the stock Suburban. Although the University of Maryland and West Virginia University tied for first place in the 2000 competition, everyone came out a winner. "FutureTruck involves working to solve one of the most serious problems facing the entire globe. It feels good to make a difference!" one team leader was heard to say.

To pass on their engineering enthusiasm to younger generations, nearly all of the FutureTruck teams developed active partnerships with local middle or secondary schools. The younger students attended FutureTruck workshops, met with team members, and learned how science and engineering can be exciting career choices that provide opportunities to create positive change in the world. During the visits, FutureTruck team members talked with the students, exhibited their advanced vehicle projects, and became real-life role models for the younger students.

FutureCar Challenge

One of the most ambitious competitions held was the FutureCar Challenge in which university teams converted a midsize production vehicle to one which got greatly improved gas mileage without sacrificing the safety, perfor-

FutureTruck 2000: The University of Maryland team demonstrates its vehicle's capabilities in the towing competition

FutureTruck 2000: West Virginia University's entry performs during the dynamic competition

The University of Texas at Austin team and their modified Silverado, winners of the 2000 Ethanol Vehicle Challenge

mance, or utility of its conventional counterpart. The FutureCar Challenge ran for four consecutive years, concluding in 1999, and was sponsored by DOE and the U.S. Council for Automotive Research (USCAR), a consortium begun by America's Big Three automakers in 1996. Over the course of the program, several of the participant teams were able to increase the fuel economy of the production counterpart by as much as 100%, while at the same time achieving spectacular reductions in tailpipe emissions. University teams also demonstrated the feasibility of using fuel cells in the automobile's powertrain and a high percentage of aluminum in the body and components to make a lighter weight vehicle. The University of Wisconsin, for instance, winner of the 1999 FutureCar Challenge, built a hybrid electric vehicle that weighed less than its conventional counterpart. In 1997, the winning FutureCar team from the University of California at Davis achieved highway fuel economy of 63 mpg with its re-engineered Ford Taurus.

Ethanol Vehicle Challenge

The Ethanol Vehicle Challenge, which began in 1998, gave college teams the opportunity to demonstrate the performance of E85 (85% ethanol, 15% gasoline) as a transportation fuel as they converted conventional vehicles into dedicated E85 vehicles. Vehicle performance, including cold-start capabilities, exhaust emissions, engineering design, on-road performance, driveability, trailer towing, off-road performance, and fuel economy were the judging criteria. Sponsored by DOE, General Motors, and Natural Resources Canada, the 2000 Ethanol Vehicle Challenge was the first to be held entirely in Canada, and was a cooperative effort of the U.S. and Canadian auto, ethanol, agriculture, and petroleum industries, academia, and government. Together, these organizations worked to advance E85 technology and provide an unparalleled engineering experience for hundreds of engineering students from 16 universities who re-engineered a Chevrolet Silverado 4x4 pickup truck to run on E85. The students' goal was to produce the most efficient, lowest-emission, and best performing vehicle. A team from the University of Texas at Austin won first place overall in the 2000 competition, beating out the other fifteen North American college and university teams to take home $6000 in prize money. Second place went to the Canadian team from the University of Waterloo, while the University of California, Riverside, captured third place. Past winners of the Challenge have been the University of Illinois at Chicago (1999), and Wayne State University (1998).

Other Competitions

The Office of Transportation Technologies has also been a major sponsor of competitions for students in the middle grades, as well as for those in high school. For middle school students there is **Junior Solar Sprint**, a fun, hands-on educational program in which 6th, 7th, and 8th graders try their skill at constructing a solar powered vehicle capable of completing a 20-meter, wire-guided sprint race. The **Electric Vehicle (EV) International Challenge** gives high school students, teachers, electric vehicle experts, and the general public an opportunity to display their knowledge or learn about EVs. In addition, the **Tour de Sol: the Great American Green Transportation Festival** is open to any group with an electric or hybrid vehicle. This competition is a long-distance road rally, with prizes going to the vehicles demonstrating the greatest range. **The American Solar Challenge** (formerly **Sunrayce**), which is sponsored by the Office of Solar Energy Technologies within the Department of Energy, conducts a biennial intercollegiate competition to design, build, and race solar-powered cars in a challenging, long-distance event.

As concern grows over the possible effects of greenhouse gas emissions, depletion of nonrenewable fossil energy resources, and an increasing dependence on imported oil, society will be challenged to develop alternative propulsion systems and fuels. The DOE-sponsored student competitions are one way of stimulating interest in science and engineering among our nation's young people while increasing the pool of valuable human resources necessary to meet the challenge.

If you would like more information about the Office of Transportation Technologies, please visit our Web site at http://www.ott.doe.gov. If your organization is interested in becoming a sponsor of the 2001 FutureTruck competition, visit the FutureTruck Web site at http://www.futuretruck.org. Information on the American Solar Challenge can be found at http:\\www.formulasun.org.

For more information on how DOE is helping America remain competitive in the 21st century, please contact:

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